
# SVAGRIHA

## Version 3

**SIMPLE VERSATILE AFFORDABLE**

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Published by

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# Message from President

The world is changing rapidly, and with it the climate crisis is becoming more and more evident. As environmental experts and leaders convene and discuss strategies to address global warming, it becomes equally important for those at grassroots levels -both creators and end users of small-scale projects to understand how they can contribute to better the environment. The United Nations fittingly states that "For the global sustainability goals to be reached, everyone needs to do their part: governments, the private sector, civil society and people like you."

I am delighted to see that GRIHA Council is now launching version 3 of their simplified rating variant SVAGRIHA, which aims to involve all in the making of a green development. SVAGRIHA V3 is designed as a tool that can help the project team take design decisions, validate the greenness of their development as well as ascertain its quantitative and qualitative impact. With an interface devised for ease of implementation and assessment, SVAGRIHA aims to be a foundational rating variant which each one of you can become adept at incorporating. Small developments can have long-lasting negative effects on India's environment and climate. Without proper evaluation, we may not fully realize the consequences of these projects. Just like a wall is built brick by brick, a sustainable world can be built, one small scale green project at a time and I invite each of you to partake in contributing to climate change mitigation through green development.

Dr. Vibha Dhawan,
President, GRIHA Council
Director General, TERI

# Message from CEO

The year's most significant event, the 2021 United Nations Climate Change Conference, also known as COP26, was recently held with the primary agenda of driving more countries to commit to net-zero emissions by 2050. The term net-zero means that all the man-made processes that increase greenhouse gases (GHG) in the environment are balanced with processes that simultaneously remove an equal amount of greenhouse emissions as well. It includes reduction of carbon emissions to the lowest amount and then offsetting the remaining to maintain an environmental balance. Mitigating climate change is a global responsibility which must be fulfilled by all countries with a meticulous, collaborative and multi-disciplinary approach.

GRIHA Council is synonymous with green buildings in India. From early on, the Government of India (GoI) in its INDC in response to the Conference of the Parties (COP) decisions has recognized Green Rating for Integrated Habitat Assessment (GRIHA) as a national tool, to evaluate GHG reduction from habitats.

GRIHA Council is pleased to introduce SVAGRIHA V.3, a simple, versatile and affordable rating variant, which now embodies the facets of design guidance, rating as well as impact analysis. It will enable project teams to quantify their reduction in carbon dioxide emissions made as a result of complying with the rating. The world needs a comprehensive rating that empowers not only professionals of the building industry but end users to understand the quantitative and qualitative environmental impact of opting for a green building versus a conventional one. The aim of this new version is to encourage and incentivize all occupants to move towards greener development and aid the country is assessing and mitigating its carbon footprint. True to the old adage 'what gets measured, gets managed', along with a carbon assessment SVAGRIHA attempts to quantify the impacts of aspects such as energy consumption, waste generation, renewable energy adoption, etc. so as to ensure efficient management of the same to the best possible extent.

The collective growth of small development around the world drives extensive material consumption and environmental impacts. In India, attention needs to be directed towards smaller development, whose direct impacts in combination with others results in significant environmental effects. And to do so, everyone, however small the development, needs to do their part in ensuring its sustainability. It is after all collective action that will address climate change.

This rating is the output of a consultative process, and I gratefully appreciate the support of all those who were associated with the development of this rating. I look forward to their continued guidance for its enhancement in the future. I also thank the team of GRIHA Council who put in concerted efforts to ensure that as we address the ever-evolving scenarios of climate change, we augment our contributions for a sustainable world.

Mr. Sanjay Seth,
CEO, GRIHA Council

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# Abbreviations

| | |
|---|---|
| BEE | Bureau of Energy Efficiency |
| BIPV | Building Integrated Photovoltaics |
| BIS | Bureau of Indian Standards |
| DBR | Design Basis Report |
| ECBC | Energy Conservation Building Code |
| EPD | Environmental Product Declaration |
| GHGs | Greenhouse Gases |
| GLGs | Good Life Goals |
| GWP | Global Warming Potential |
| HCFC | Hydrochlorofluorocarbons |
| HVAC | Heating, Ventilation and Airconditioning |
| IAQ | Indoor Air Quality |
| IDP | Insulated Daylighting Panel |
| INDC | Intended Nationally Determined Contributions |
| LPD | Lighting Power Density |
| NBC | National Building Code |
| OPC | Ordinary Portland Cement |
| SDGs | Sustainable Development Goals |
| SHGC | Solar Heat Gain Coefficient |
| SRI | Solar Reflective Index |
| VOC | Volatile Organic Compound |

# Definitions

**Artificial Light:** Supplemental light generated artificially through conversion of an energy source into a lighting source to perform functions and tasks and achieve visual comfort when natural light is suboptimal.

**Built-up Area:** The area covered by a building on all floors including cantilevered portion, mezzanine floors, if any, but except the areas excluded specifically under building bye-laws (Unified Building Bye Laws for Delhi 2016)

**Ergonomics:** It is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human wellbeing and overall system performance (International Ergonomics Association n.d.).

**Insolation:** It is a measure of the solar energy that is incident on a specified area over a set period of time (Donev, Afework, Boechler, et al. 2021).

**Lighting Power Density:** This is the maximum lighting power per unit area of a building classification of space function (Visvesvaraya 2016).

**Net Zero Energy Building:** It refers to a building with net zero energy consumption, which means the total amount of energy used by the building on an annual basis is equal to the amount of renewable energy created on-site (Energy Alabama 2019).

**Organic Waste:** It is the biodegradable waste that comes from either a plant or an animal which breaks down into CO2, methane, or simple organic molecules.

**Passive Design:** These are design strategies that maximize the use of 'natural' sources of heating, cooling, and ventilation to create comfortable conditions inside buildings. It harnesses environmental conditions such as solar radiation, cool night air, and air pressure differences to drive the internal environment. Passive measures do not involve mechanical or electrical systems (Designing Buildings 2020).

**Peak Heat Transfer:** It the maximum heat transferred through the building envelope when the summation of solar radiation received on all surfaces is the maximum.

**Perviousness:** It is the permeability of a surface, that is, the amount of fluid a surface allows to percolate through it.

**Site Area:** A parcel (piece) of land enclosed by definite boundaries. (NBC Volume 1, 2016)

**U-value:** Thermal transmission through unit area of the given building unit divided by the temperature difference between the air or other fluid on either side of the building unit in steady state conditions is called as U-value. Its unit is $W/m^2K$. (NBC Volume 1, 2016)

# INTRODUCTION

# Introduction

SVAGRIHA, an abbreviation for Simple Versatile Affordable GRIHA, was conceived to spread the concept of green buildings and sustainability to stakeholders of small projects, that is, owners of projects such as bungalows and small offices. It was developed as a simple guidance-cum- rating tool to ramp up its adoption by general masses and further minimize the GHG emissions caused by small-scale constructions.

The new version of SVAGRIHA further the dimension of this tool by appending an impact evaluation calculator. This online tool will guide the users towards selecting appropriate design strategies for their projects, based on the site and climatic conditions. It will also help them to perform qualitative and/or quantitative impact assessment of their projects. Informed decisions during the initial stage of construction can help in minimizing the deleterious effects of the development on the environment.

# Rating Framework

SVAGRIHA version 3 is a guidance cum rating cum impact analysis tool, which is developed for projects with built-up area 100 $m^2 \leq x \leq 2500$ $m^2$. Developed as an online tool, the rating system will evaluate the performance of a registered project against SVAGRIHA base cases, which are established for select criteria.

- **Section and point weightages**
  - The rating system has seven sections based on which a project will be evaluated. These sections are Sustainable Site Planning, Low Environmental Impact Building Materials, Energy Optimization, Occupant Comfort and Well-being, Water Management, Solid Waste Management, and Sustainable Lifestyle. The maximum points that a project can achieve from these sections are 50.
  - The eighth section is 'Innovation', which acts as a bonus section. A project team can achieve a maximum of 2 points from this section. These points will be additional to 50 points dedicated to the previously mentioned seven sections and only be added to the numerator and not to the denominator.
  - These sections are further divided into 14 criteria that act as both design guidelines and point scoring parameters for the project.
  - Mandatory requirements:
    - The project team must attempt the minimum prescribed points under each section, also shown in Table 1.
    - The project must have all the necessary clearances as per the local building bye-laws/municipal authorities. It should comply with the coastal zone regulations, eco-sensitive zone regulations, heritage areas, waterbody zones, or any other such regulation concerning a potential hazard area.

**Note: In case a project does not fulfil the mandatory requirements, it will be ineligible for the rating.**

**Table 1:** Sections, criteria and points in SVAGRIHA V. 3.

| Sections | Criterion number | Criterion name | Maximum points of the criterion | Maximum points of the section | Minimum points to be achieved in the section |
|---|---|---|---|---|---|
| Sustainable Site Planning | 1 | Site Planning | 5 | 12 | 6 |
| | 2 | Passive Design Strategies | 3 | | |
| | 3 | Efficient Envelope Design | 4 | | |
| Low Environmental Impact Materials | 4 | Low Environmental Impact Materials in Structure | 2 | 7 | 4 |
| | 5 | Low Environmental Impact Materials in Walling | 2 | | |
| | 6 | Low Environmental Impact Materials in Fenestrations & Interiors | 3 | | |
| Energy Optimization | 7 | Optimizing Energy Consumption | 5 | 8 | 4 |
| | 8 | Renewable Energy Utilization | 3 | | |
| Occupant Comfort and Well-being | 9 | Indoor Air Quality & Comfort | 7 | 7 | 4 |
| Water Management | 10 | Reduction in Building & Landscape Water Demand | 5 | 8 | 4 |
| | 11 | Rainwater Management | 3 | | |
| Solid Waste Management | 12 | Solid Waste Management | 3 | 3 | 1 |
| Sustainable Lifestyle | 13 | Adoption of Sustainable Lifestyle | 5 | 5 | 2 |
| Innovation | 14 | Innovation | 2 | 2 | - |

- **Criteria Structure**

  Each criterion consists of the following:

  - **Intent**: This defines the specific purpose of a particular criterion in the rating system, which is directed towards achieving the larger goal of sustainability and reducing GHG emissions.
  - **Appraisals:** These are the guidelines specified under each criterion to help the project proponent to create a sustainable built environment and achieve SVAGRIHA rating by demonstrating compliance with them. The appraisals are categorized as follows:
    - **Optional**: Each optional appraisal carries a few points. Project proponents can achieve these points by demonstrating compliance with these appraisals upon submission of relevant documents. Compliance with these appraisals is at the discretion of the proponent, depending upon their site conditions, feasibility and desired rating while considering the minimum points under the respective section.
    - **Non-applicable:** In case of specific site constraints, certain appraisals become non-applicable to the project. Points allotted under these appraisals are subtracted from the denominator during the final points calculation. However, the project team must submit necessary documents (as mentioned in the respective detailed criteria later in the manual) to claim non-applicability.

- **Compliance:** This consists of a list of documents to be provided by the project team to demonstrate compliance with the appraisals to achieve points.
- **Details of Appraisals:** The steps involved in fulfilling the appraisal requirements are described in the 'Details of Appraisals'. This shall include the details of concepts, calculations, and strategies required to be understood to comply with the appraisals. (This part shall be provided be in the detailed SVAGRIHA V.3 manual)
- **Sample documentation:** This part of the criterion shall exhibit the examples of the documents listed in the 'compliance' section. (This part shall be provided in the detailed SVAGRIHA V.3 manual)

- **Scores and rating**

  SVAGRIHA is a 50-point rating system. After the submission of the required documents and final assessment and evaluation, the project is awarded/denied points for all the applicable appraisals. Total applicable points become the denominator while points that are not applicable (as confirmed through documentation assessment) to the project are deducted from both denominator and numerator. The awarded points represent the numerator. Also, points awarded under the innovation section are added only in the numerator, making them the bonus points. Based on the points obtained, star rating is awarded as listed in Table 2.

**Table 2:** Points required to be achieved for star rating

| Points | SVAGRIHA Rating |
|---|---|
| 25–29 | ☆ |
| 30–34 | ☆☆ |
| 35–39 | ☆☆☆ |
| 40–44 | ☆☆☆☆ |
| 45–50 | ☆☆☆☆☆ |

# Key Features of SVAGRIHA V.3.

- **Impact Analysis Tool:** The SVAGRIHA panel will enable the users to design their buildings sustainably and obtain certification. Additionally, it will also help them to understand the qualitative and/or quantitative impact of their project on the environment.
  - **Quantitative Impact Analysis:** A project proponent will be able to understand the impact of strategies adopted in the project in terms of total carbon emissions. A comparative analysis would be presented between carbon emissions from the SVAGRIHA's 'base case' (conventional scenario) and 'design case' (the project registered under SVAGRIHA). Quantitative impact analysis would be presented for the sections and criteria mentioned in Table 3.

**Table 3:** List of sections/criteria considered for quantitative analysis

| Sections | Criteria |
|---|---|
| Sustainable Site Planning | 1, 2 & 3 |
| Low Environmental Impact Materials | 4, 5 & 6 |
| Energy Optimization | 7 & 8 |
| Water Management | 10 & 11 |
| Solid Waste Management | 12 |
| Sustainable Lifestyle | 13 – Appraisal 13.1.1. & 13.1.2. |

- **Qualitative Impact Analysis:** The impact of all sustainable design strategies may not always be expressed in terms of carbon emissions. However, their impact can be observed in the form of enhanced live ability, productivity, and improved overall health.

**Table 4:** List of sections/criteria considered for qualitative analysis

| Sections | Criteria |
|---|---|
| Sustainable Site Planning | 1 & 3 |
| Occupant Comfort and Well-being | 9 |
| Sustainable Lifestyle | 13 – Appraisal 13.1.3. & 13.1.4. |

Through a qualitative analysis, SVAGRIHA aims to provide an understanding of the impact of such strategies, with regard to a tentative increase in the productivity of end users of the project. The qualitative impact analysis would be done for sections/criteria mentioned in Table 4.

- **Introduction of new concepts in the rating system:**
  - **Ergonomics:** It aims at creating user satisfaction through optimized design solutions.
  - **Indoor environment quality:** This aims at ensuring improved thermal, visual, and acoustic performance of the building along with better indoor air quality (IAQ).

- **Good Life Goals:**
  The Good Life Goals (GLGs) were rolled out by the United Nations to encourage individuals to participate in improving the health of our planet and live in harmony with nature and other beings. The GLGs aim at the larger goal of achieving the 17 Sustainable Development Goals (SDGs). 'The SDGs, also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity' (UNDP 2021).

SVAGRIHA targets to achieve a few of the GLGs by adopting the design guidelines specified in various sections of the rating system. Table 5 enlists the various sections of the rating system and the GLGs they are aligned with.

**Table 5:** List of sections in SVAGRIHA and Good Life Goals they are aligned with

| S.No. | Sections | Criteria |
|---|---|---|
| 1 | Sustainable Site Planning | 9,11 and 12 |
| 2 | Low Environmental Impact Materials | 12,13 and 15 |
| 3 | Energy Optimization | 7,12, and 13 |
| 4 | Occupant Comfort and Well-being | 3, 7, 9 and 12 |
| 5 | Water Management | 6 |
| 6 | Solid Waste Management | 12 |
| 7 | Sustainable Lifestyle | 3,8,9 and 13 |
| 8 | Innovation | 9 |
| List of total GLGs | | |
| GLG 1: Help End Poverty<br>GLG 2: Eat Better<br>GLG 3: Stay Well<br>GLG 4: Learn and Teach<br>GLG 5: Treat Everyone Equally<br>GLG 6: Save Water<br>GLG 7: Use Clean Energy<br>GLG 8: Do Good Work GLG 9: Make Smart Choices | | GLG 10: Be Fair<br>GLG 11: Love Where You Live<br>GLG 12: Live Better<br>GLG 13: Act on Climate<br>GLG 14: Clean Our Seas<br>GLG 15: Love Nature GLG 16: Make Peace<br>GLG 17: Come Together |

# Eligibility

- **Built-up area:** All new construction projects with a built-up area 100 $m^2 \leq x \leq 2500\ m^2$ are eligible for certification under SVAGRIHA rating system. The following areas shall be excluded from the built-up area and shall not be considered for registration fees calculation:
  - Parking area (Stilt/Basement): Non-habitable basement spaces
  - Service rooms: These are dedicated to building services, such as electrical room, server room, meter room, etc., with no occupancy.
- **Building typology:** All habitable buildings are eligible for SVAGRIHA rating. The various types of buildings, based on their usability, are categorized in Table 6.

**Table 6:** Classification of buildings according to their typologies

| Residential | Non-Residential | | | | | |
|---|---|---|---|---|---|---|
| | Commercial | | Institutional | Healthcare | Hospitality | Transit Terminals |
| | Office | Retail | | | | |
| Bungalow | Office spaces | Shops | Schools/institutions | Hospitals | Hotels | Airport |
| Villas/Mansions | Co-working spaces | Banquets | Libraries | Clinic | Guest Houses | Bus terminal |
| Multi-dwelling units | Courts | Restaurants/Cafeteria | Sports Club | Dispensaries | Service Apartments | Railway Station |
| Hostels | | Gallery/Museum | Research Labs | Nursing Homes | Community/ Visitors Center | |
| Millitary Barracks | | Studios/Auditoriums/ Theatres | Place of Workship | | | |

- **Building operation schedule:** With a wide range of typologies being considered in the rating system, the operation schedule of a registered project is categorized as presented in Table 7.

**Table 7**: Building operation schedule

| S.No. | Frequency of Operation | Operation Duration |
|---|---|---|
| | Hours | Days |
| 1 | 8 | 5 |
| 2 | 24 | 7 |

Note: Building schedules that are not mentioned in the table above shall be assessed based on the submission of a design basis report. Thresholds and benchmarks for such projects shall be calculated using the methodology of extrapolation.

- **Climate:** Five climate zones have been considered in SVAGRIHA V.3. as per ECBC, which are
  - Temperate
  - Hot-dry
  - Warm-humid
  - Composite
  - Cold

# Rating Process

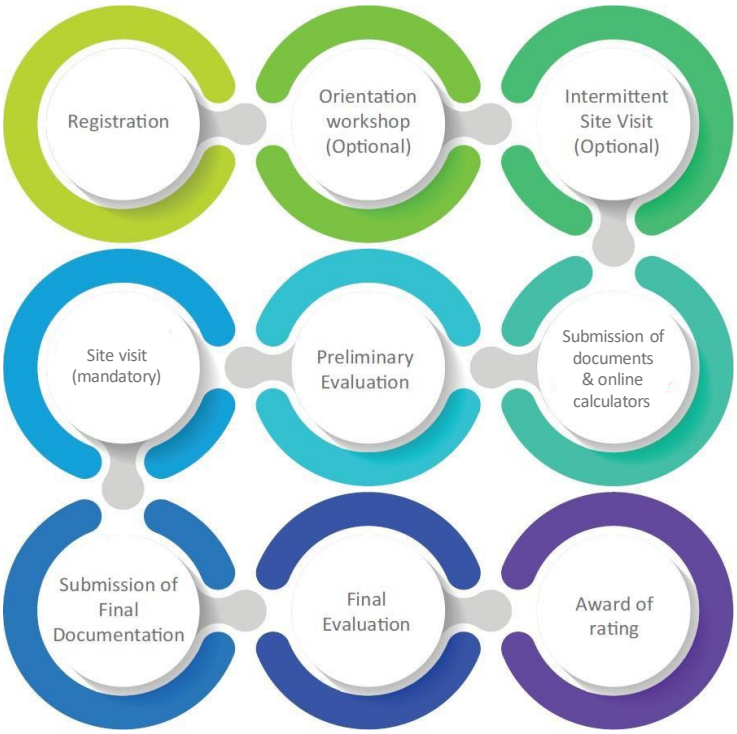
The rating process of SVAGRIHA V. 3. is as follows:

**Step I: Registration**

- To apply for SVAGRIHA rating, a project has to be registered by filling in an online registration form available on GRIHA website (www.grihaindia.org). The right time to register is during the inception of the project. This would ensure seamless integration of sustainable design & construction strategies and procurement of low energy materials & efficient systems.
- **Fee calculation:** The fees for SVAGRIHA rating is calculated as per the built-up area. Please refer to the GRIHA website (www.grihaindia.org) to calculate the same.
- **Confirmation of registration and access to online panel:** A unique project code is generated upon registration along with the project-specific username and password. These will be shared with the project team on the email IDs mentioned in the online registration form. The username and password will enable the project team to access the online panel where all the compliance documents will be submitted by them. In addition to this, the panel is equipped with inbuilt calculators for specific criteria, provided for the ease of the project team and compliance requirements. Furthermore, project-specific data must be added to these calculators to check criteria-specific performance and fulfill submission requirements.

**Step II: Orientation Workshop (Optional)**

The orientation workshop, conducted by GRIHA officials/field experts who are assigned by GRIHA Council, is a rigorous training session of 1 day for the whole project team. The team comprises owners, architects, contractors, and team members from civil, plumbing, electrical, and mechanical departments, etc.



The workshop is advised to be conducted before commencement of the construction activities on- site and after all the team members are on board.

The workshop is an important step towards making a green building as it gives the project team a platform to understand the rating system while getting familiarized with on-site challenges and possible solutions available for their scope of work. It allows the project team to discuss project-specific queries with the GRIHA officials directly. It is part of an integrated design approach which aims at providing the following:

- Overview of green buildings
- Brief introduction to SVAGRIHA: sections, weightage points, and the evaluation process
- Explanation of the rating system: criteria, appraisals, and points related to rating
- Documentation requirements
- Case studies of SVAGRIHA-rated buildings

**Step III: Intermittent Site Visit (Optional)**

A visit will be conducted to assess the development of the project and to facilitate the project team to achieve the desired rating. Any shortcomings observed with respect to the rating during this visit will be communicated to the project team.

**Step IV: Submission of Documents and Online Calculators**

As the project nears completion, the project proponent should upload the documents for all the criteria on the online panel. A list of the documents is provided under each criterion on the panel and in SVAGRIHA manual.

Further, online calculators provided on the panel need to be duly filled and submitted. Once online submission of the documents for all the criteria is completed, the evaluation process for rating would commence.

**Step V: Preliminary Evaluation**

After the online submission, a preliminary evaluation is carried out by a team of professionals that includes GRIHA Council officials and external evaluators. External evaluators are experts in their respective fields recognized by GRIHA Council. A preliminary evaluation report shall be uploaded on the online panel by the Council within 25 working days after the submission of documents. The review report will help the project team in understanding the status of the submitted documentation and the issues in achieving final rating. The project team will be made aware of all the missing or incomplete documentation so that the same can be submitted to achieve the desired rating.

**Step VI: Site Visit (Mandatory)**

The mandatory site visit under SVAGRIHA rating is conducted upon completion of the project. This shall be conducted to verify the submitted documentation with respect to on-site implementation. The visit is done once the project is complete, and all equipment and systems are installed and commissioned.

**Step VII: Submission of Final Documentation:**

Project team must submit all missing documentation as communicated by GRIHA Council during the site visit and through preliminary evaluation feedback. Final rating would be awarded to the project on the basis of the submitted documents.

**Step VIII: Final Evaluation and Award of Rating**

The GRIHA Council officials along with external evaluators shall then evaluate the final round of submitted documentation. Based on this evaluation, GRIHA Council shall prepare a final score card within 15 working days after the project team furnishes all requisite information sought by the evaluators.

**Note:**

- The orientation workshop and the intermittent site visit are not mandatory. They are conducted only on request from the project proponent along with a payment of additional fees.
- Observations of the visits shall be recorded in the form of site visit reports. The same reports shall be uploaded on the online panel and sent to the client and other team members within 15 working days from the date of the respective site visits. These reports shall capture observations and suggest actions that are required to be taken by the project team to make the project compliant with GRIHA requirements at the given stage and later during the evaluation stage.

# SECTION 1: SUSTAINABLE SITE PLANNING

Criterion 1: Site Planning
Criterion 2: Passive Design Strategies
Criterion 3: Efficient Envelope Design

# Criterion 1: Site Planning

## Intent

The intent of this criterion is to ensure minimum disturbance to the existing site features while enhancing the biodiversity and regulating micro-climate on-site.

**Maximum Points –5**

## 1.1 Appraisal

**Maintaining softscape of the site:**

1.1.1. The percentage of softscape (including landscape/natural ground/pervious area of grass pavers) on- site (roof, podium, and on ground) must be at least

- 10% of the site area for non-residential projects and
- 25% of the site area for residential projects

**–1 Point**

**Maintaining site temperatures:**

1.1.2. At least 50% of the total paved area on-site (including roof) should be treated as follows:

- Shaded with trees, vegetated pergolas, etc.
- Shaded with solar photovoltaic panels, canopies, etc.
- Have surface finish of high SRI (solar reflectance index) tiles or paints.

**–1 Point**

**Note**: Roof paints must have a minimum solar reflectance of 0.60 and a minimum emittance of 0.90 OR must achieve a minimum SRI of 0.70 to meet the compliance.

**Increasing green cover:**

1.1.3. Protect mature trees that are located within the site setbacks as specified in city regulations. In case no site setbacks are applicable, trees located on-site within 2 meters from its boundary must be preserved and protected.

**–1 Point**

**Applicability check**: If there are no existing mature trees within the site setbacks, the project is exempted from Appraisal 1.1.3.

To exempt the project from Appraisal 1.1.3, please submit the following:

- Submit site survey plan showing existing site features before commencement of construction activities, along with date- stamped photographs of the site before commencement of construction.

1.1.4. Ensure that the number of trees on-site is as follows:

- If the built-up area is **less** than site area, then the project must ensure a minimum of 1 tree per **250 $m^2$ of the site area**.
- If the built-up area is **more** than the site area, then the project must ensure a minimum of 1 tree per **250 $m^2$ of the built-up area**.

Recommendations to comply with the aforementioned appraisal:

- Preserve and protect existing mature trees on-site and/or

- Transplant existing mature trees within the site and ensure that they survive and/or
- Plant trees of native/naturalized species and /or
- Adopt any combination of the above.

**–1 Point**

1.1.5. Ensure that the number of trees on-site is as follows:

- If the built-up area is **less** than site area, then the project must ensure a minimum of 1 tree per **200 $m^2$ of the site area**.
- If the built-up area is **more** than site area, then the project must ensure a minimum of 1 tree per **200 $m^2$ of the built-up area**.

**–1 Point**

**Note**:

- Potted plants are not acceptable.
- For transplanted trees, the project must demonstrate a survival period of at least 1 year.
- In case of campus projects, Appraisals 1.1.4 and 1.1.5 can be by plantation within the campus boundary.
- Definitions for the built-up and site areas are particular to SVAGRIHA V. 3. (Refer to the definitions provided in the detailed SVAGRIHA V.3 manual)

## 1.2. Compliance

1.2.1. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisal 1.1.1 to 1.1.5.

1.2.2. Submit site plan (in .dwg format) with area statements highlighting (in different colour coding and layers) various site finishes and treated areas, to demonstrate compliance with Appraisals 1.1.1 to 1.1.5.

1.2.3. Submit purchase orders and specification sheets highlighting the SRI value of the paints/ tiles used.

OR

1.2.3. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

1.2.4. Submit site survey plan, back dated Google Earth images along with date-stamped photographs of the site from after the site allotment, highlighting the number of existing trees.

1.2.5. Submit letter from the local governing body permitting cutting of trees on-site to demonstrate compliance with Appraisals 1.1.4 and 1.1.5.

1.2.6. Submit purchase orders highlighting full quantities of new plantation to demonstrate compliance with Appraisals 1.1.4 and 1.1.5.

1.2.7. Submit a narrative and date stamped photographs of all the measures being implemented on site.

# Criterion 2: Passive Design Strategies

## Intent

The intent of this criterion is to encourage the adoption of passive architectural strategies in site planning and building design to create climate-sensitive development.

**Maximum Points –3**

## 2.1 Appraisal

2.1.1. Adopt passive design and planning strategies in the project.

**Table 2.1:** Point allocation for passive design strategies

| No. of Strategies Adopted | Points |
|---|---|
| At least 2 passive design strategies | 1 |
| At least 3 passive design strategies | 2 |
| At least 4 passive design strategies | 3 |

## 2.2. Compliance

2.2.1. Submit a narrative along with calculations/illustration and date-stamped photographs for each strategy being implemented.

2.2.2. Submit site and floor plan along with other documents for low-impact design strategies being implemented, as mentioned in Table 1.3. (Refer to the table provided in the detailed SVAGRIHA V.3 manual)

# Criterion 3: Efficient Envelope Design

## Intent

The intent of this criterion is to ensure an efficient building envelope that resists heat transfer.

**Maximum Points –4**

## 3.1. Appraisal

### Insolation Analysis

**3.1.1. Composite/warm and humid/hot and dry/temperate climates:** Reduce the percentage of overall insolation through fenestration, from the base case in accordance with Table 3.1.

OR (as applicable)

**Cold climates:** Increase the percentage of overall insolation through fenestration, from the base case in accordance with Table 3.2.

**–2 Points**

**Table 3.1:** Percentage **reduction** from the base case as per climate type

| Climate Type | Percentage Reduction from Base Case | Points |
|---|---|---|
| Composite/Warm & humid/hot & dry | 30% ≤ x < 45% | 1 |
| | 45% ≤ x | 2 |
| Temperate | 10% ≤ x < 20% | 1 |
| | 20% ≤ x | 2 |

**Table 3.2:** Percentage **increase** from the base case for cold climate

| Climate Type | Percentage Increase from Base Case | Points |
|---|---|---|
| Cold | 10%≤ x < 25% | 1 |
| | 25%≤ x | 2 |

### Peak Heat Transfer

**3.1.2. Composite/warm and humid/hot and dry/temperate climates:** Ensure that peak heat gain through the building envelope is lower than the SVAGRIHA threshold as per Table 3.3. OR (as applicable)

**Cold climates:** Ensure that peak heat loss through the building envelope is lower than the SVAGRIHA threshold as per Table 3.4.

**–2 Points**

**Table 3.3:** Thresholds for **peak heat gain** through the building envelope

| Climate | Threshold (W/m²) | Points |
|---|---|---|
| Composite | 110 ≥ x > 85 | 1 |
| | 85 ≥ x | 2 |
| Hot Dry | 105 ≥ x > 80 | 1 |
| | 80 ≥ x | 2 |
| Warm Humid | 100 ≥ x > 75 | 1 |
| | 75 ≥ x | 2 |
| Moderate | 90 ≥ x > 55 | 1 |
| | x ≤ 55 | 2 |

**Table 3.4**: Thresholds for **peak heat loss** through the building envelope

| Climate | Threshold ($W/m^2$) | Points |
|---|---|---|
| Cold | $25 \geq X > 10$ | 1 |
| | $X \leq 10$ | 2 |

## 3.2. Compliance

3.2.1. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisals 3.1.1 and 3.1.2.

3.2.2. Submit date-stamped photographs demonstrating the building materials as installed on site.

3.2.3. Submit technical specification sheets of the glazing highlighting U-value and solar heat gain coefficient (SHGC) to demonstrate compliance with Appraisals 3.1.1 and 3.1.2.

3.2.4. Submit floor plans, elevations, building sections, and envelope cross-sections (in .dwg format) indicating envelope materials, their specifications, thickness, etc., to demonstrate compliance with Appraisals 3.1.1 and 3.1.2.

3.2.5. Submit purchase orders (reflecting full quantities)/applicable sections of the BOQ (signed and stamped) of all materials used in wall, roof, and glazing assembly and subassembly to demonstrate compliance with Appraisals 3.1.1 and 3.1.2.

# SECTION 2: LOW ENVIRONMENTAL IMPACT MATERIALS

Criterion 4: Low environmental impact materials in structure
Criterion 5: Low environmental impact materials in walling
Criterion 6: Low environmental impact materials for fenestrations and interiors

# Criterion 4: Low environmental impact materials in structure

## Intent

The intent of this criterion is to promote the use of low environmental impact materials which minimize the detrimental impact of construction on environment by minimizing the use of virgin materials and diverting wastes (as per industry standards) from the landfills for upscaling and use in the construction sector.

**Maximum Points: 2**

## 4.1. Appraisal

4.1.1. 100% of OPC is replaced by PPC used in building structure, masonry mortar and plaster.

**–1 Point**

4.1.2. Implement one or more of the SVAGRIHA-listed building materials and practices as given in Table 4.1.

**–1 Point**

**Table 4.1:** Sustainable building materials and practices

| Sr. No. | Category | Intent | Practice/Material |
|---|---|---|---|
| 1 | Filler Slab | Use of waste as filler & reduction in slab concrete | Glass bottles/glass tiles/clay pots/polystyrene waste/e-waste as fillers |
| 2 | Roof | Use of recycled/ reclaimed material/ sustainable local practices | Reclaimed or recycled steel sheets (post-consumer)/ Ferrocrete-Mud rolls and Ferrocrete-Paper tubes |
| 3 | Aggregate | Use of recycled/ reclaimed material | A minimum 5% replacement of natural aggregate with recycled concrete aggregate/recycled aggregate by weight of that category of aggregate in structural concrete |
| 4 | Concrete | Replacement with sustainable materials* | Ferrock as a replacement to concrete/ replacement with $CO_2$-sequestrated concrete |
| 5 | Structural steel | Replacement with sustainable materials | Replacement of structural steel with bamboo |
| | | Reduction in material use | Use of practices such as post-tensioning and pre-tensioning. |

**Other than the use of BIS recommended wastes.*

**Note**: A combination of sustainable building materials and practices for the building structure can be used. The list provided in Table 2.1 is not an exhaustive one. Other materials and practices may be enlisted provided they are applicable only to the listed categories and intent.

## 4.2. Compliance

4.2.1. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisals 4.1.1 and 4.1.2.

4.2.2. Submit purchase order/BOQ highlighting the procurement of PPC.

4.2.3. Submit plans, sections, and other detailed drawings (in .dwg format) of the total area covered by the sustainable building material/ practice, highlighting clear dimensions to demonstrate compliance with Appraisal 4.1.2.

4.2.4. Submit purchase orders (reflecting full quantities) and relevant sections of the BOQ (signed and stamped) highlighting the quantities of each sustainable building material/ practice used in the project to demonstrate compliance with Appraisal 4.1.2.

4.2.5. Submit technical specification sheets/brochures of the sustainable building material/ practice being used highlighting the recycled content/other relevant properties to demonstrate compliance with Appraisal 41.2.

OR

4.2.5. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

4.2.6. Submit narrative along with date-stamped photographs demonstrating the use of materials used to demonstrate compliance with Appraisal 4.1.1. and 4.1.2.

# Criterion 5: Low environmental impact materials in walling

## Intent

The intent of this criterion is to promote use of low environmental impact materials in the walling assembly to ensure carbon footprint is minimized.

**Maximum Points: 2**

## 5.1. Appraisal

**Internal and external walls**

5.1.1. Ensure that 100% of the building blocks of all load-bearing and non-load-bearing walls are constructed using any combination of low environmental impact materials as listed in Annexure 2 of the detailed SVAGRIHA V.3 manual.

**–1 Point**

**Plaster**

5.1.2. Ensure that 100% of the plastering of all load-bearing and non-load-bearing walls uses any combination of low environmental impact materials as listed in Annexure 2 of the detailed SVAGRIHA V.3 manual.

**–1 Point**

**Applicability check:** If there is no plaster used in the project as in the case of form finished or exposed concrete walls, the project is exempted from Appraisal 5.1.2.

To exempt the project from Appraisal 5.1.2, please submit the following:

- Tender document along with date-stamped photographs highlighting the type of wall to be constructed, and the type of finishing agent used for the same.
- Purchase orders reflecting full quantities of the alternative materials and the type of finishing agent used for the same.

## 5.2. Compliance

5.2.1. Submit plans and sections (in .dwg format) highlighting the total area under each applicable category and the area covered by low environmental impact materials with clear dimensions.

5.2.2. Submit purchase orders (reflecting full quantities)/relevant sections of the BOQ (signed and stamped) highlighting the quantities of all low environmental impact materials used.

5.2.3. Submit technical specification sheets/third party test reports/EPD for the materials used in the wall assembly (masonry block and plaster)

OR

5.2.3. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

5.2.4. Submit narrative along with date-stamped photographs demonstrating the use of materials to demonstrate compliance with Appraisals 5.1.1. and 5.1.2.

# Criterion 6: Low environmental impact materials for fenestrations and interiors

## Intent

The intent of this criterion is to promote the use of low environmental impact materials in building fenestrations and interiors to ensure that its carbon footprint is minimized.

**Maximum Points: 3**

## 6.1 Appraisal

6.1.1 Ensure that a percentage of total materials (calculated by surface area and as applicable) from the categories of false ceiling, flooring and door panels are replaced with materials listed in Annexure 2 of the detailed SVAGRIHA V.3 manual, as per benchmarks in Table 6.1.

**Table 6.1:** Replacement benchmarks and corresponding points

| Replacement Benchmark | Points |
|---|---|
| 70% ≤ x <90% | 1 |
| 90% ≤ x | 2 |

6.1.2. Ensure that 100% of the total materials (calculated by length and as applicable) in the following category are constructed from materials listed in Annexure 2 of the detailed SVAGRIHA V.3 manual.

- Window frames (internal and external)
- Door frames (excluding building entrance/exit doors at ground level and fire safety doors)

**–1 Point**

## 6.2. Compliance

6.2.1. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisals 6.1.1 and 6.1.2.

6.2.2. Submit plans, sections, and other detailed drawings (in .dwg format) of the total area under each applicable category and the area covered by low environmental impact materials, highlighting clear dimensions.

6.2.3. Submit purchase orders (reflecting full quantities) and relevant sections of the BOQ (signed and stamped) highlighting quantities of all the low environmental impact materials used.

6.2.4. Submit technical specification sheets/brochures, and/or EPD of the materials used in interiors.

OR

6.2.4. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

6.2.5. Submit narrative and date-stamped photographs demonstrating the use of materials to demonstrate compliance with Appraisals 6.1.1. and 6.1.2.

# SECTION 3: ENERGY OPTIMIZATION

Criterion 7 : Optimizing Energy Consumption
Criterion 8 : Renewable Energy Utilization

# Criterion 7: Optimizing Energy Consumption

## Intent

The intent of this criterion is to promote the reduction in energy consumption of a building through the installation of energy-efficient lighting and appliances.

**Maximum Points: 5**

## 7.1. Appraisal

7.1.1. Demonstrate lower Lighting Power Density (LPD) levels in the project's interior lighting design that is based on ECBC 2017 recommended LPD levels.

**–1 point**

7.1.2. Demonstrate lower LPD levels in the project's exterior lighting design as compared to the ECBC 2017 recommended LPD levels, enlisted in Table 7.1.

**–1 point**

**Table 7.1 :** Exterior building lighting power thresholds

| Exterior Lighting Application | LPD (W/m²) |
|---|---|
| Building Entrance (with canopy) | 10W/m² of Canopied Area |
| Building Entrance (w/o canopy) | 90W/ linear m of Door Width |
| Building Exit | 60W/linear m of Door Width |
| Building Façade | 5.0W/m² of Vertical Façade Area |
| Emergency Signs, Atm Kiosks, Security Areas Façade | 1.0 |
| Driveways and Parking (open/ external) | 1.6 |
| Pedestrian Walkways | 2.0 |
| Stairways | 10.0 |
| Landscaping | 0.5 |
| Outdoor Sales Area | 9.0 |

7.1.3 Demonstrate that all the appliances installed (as per Table 7.2) are BEE star labelled or of equivalent performance.

**Table 7.2:** List of BEE-star labelled appliances and corresponding points

| Appliances | 1 star | 3 star | 4star | 5 star |
|---|---|---|---|---|
| Ceiling Fan | Mandatory | 1 point | 2 points | 3 points |
| Split/Window Air Conditioners/Variable Split Air Conditioner | | | | |
| Electric Geyser | | | | |
| Refrigerators | | | | |
| Television | | | | |

## 7.2. Compliance

7.2.1. Submit calculations/inputs on the SVAGRIHA online panel to demonstrate compliance with Appraisals 7.1.1 and 7.1.2.

7.2.2. Submit internal artificial lighting drawings (in .dwg format) with legend along with type and number of lighting fixtures installed in the building.

7.2.3. Submit external artificial lighting drawings (in .dwg format) with legend along with type and number of lighting fixtures installed in the outdoor area of the project.
7.2.4. Submit plans (in .dwg format) with legend along with type and number of each type of appliances installed in the building.
7.2.5. Submit technical specifications of all the interior lights, exterior lights, and appliances installed in the project.

OR

7.2.5. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.
7.2.6. Submit purchase orders of all the interior lights, exterior lights, and appliances installed in the project.
7.2.7. Submit photographs of all the interior lights, exterior lights, and appliances installed in the project.

# Criterion 8: Renewable Energy Utilization

## Intent

The intent of this criterion is to promote the installation of RE systems in projects to reduce the dependency on conventional sources of energy, and thereby reduce carbon emissions.

**Maximum Points: 3**

## 8.1 Appraisal

8.1.1 Ensure installation of on-site RE system(s) (solar hot water** system/solar PV/wind turbine etc.) of the capacity as mentioned in Table 8.1. Refer to Table 8.2 (as applicable) for associated points.

**Table 8.1:** Capacity of solar PV system to be installed as per built-up area

| Total Built-up Area of the Project (m²) | Required Minimum Capacity of RE System (kW) = X |
|---|---|
| 100–500 | 1 |
| 501–1000 | 2 |
| 1001–1500 | 3 |
| 1501–2000 | 4 |
| 2001–2500 | 5 |

**Table 8.2**: Point thresholds for total calculated installation for residential buildings

| Installed Capacity | Points (applicable to residential projects) | Points (applicable to non-residential projects) |
|---|---|---|
| X | **1** | - |
| X + 25% of X | **2** | **1** |
| X + 50% of X | **3** | **2** |
| X + 75% of X | - | **3** |

***100 LPD solar hot water system will be equivalent to 1.5 kWp.*

## 8.2. Compliance

8.2.1. Submit calculations/inputs on the SVAGRIHA online panel to demonstrate compliance Appraisal 8.1.1.

8.2.2. Submit a purchase order (reflecting full quantities) of the RE system(s) installed on-site

AND

Submit technical specification sheet highlighting the panel performance (as tested under standard test conditions).

OR

8.2.2. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

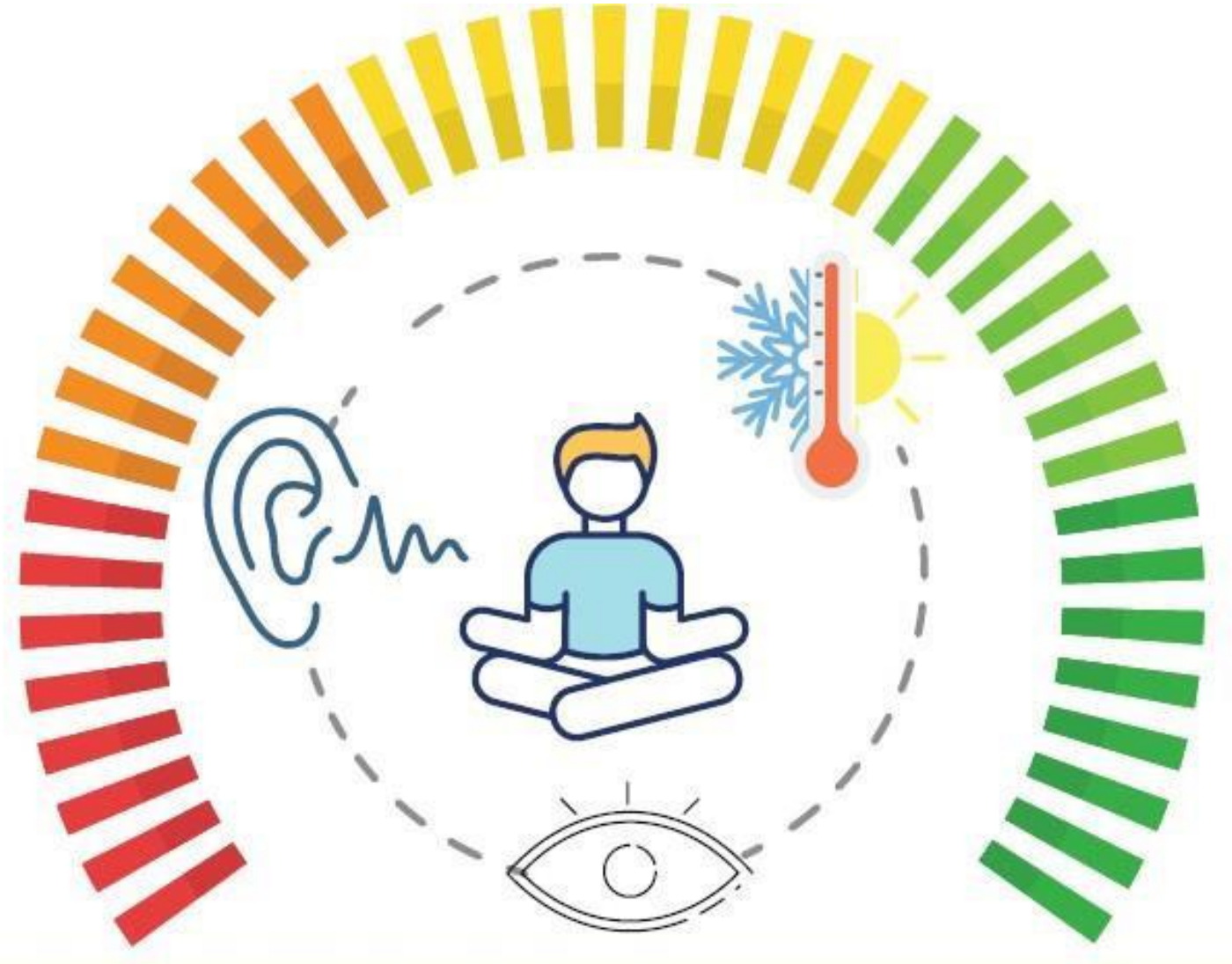
8.2.3. Submit drawings demarcating the location of RE systems.

8.2.4. Submit energy generation potential report (if available).

OR

8.2.4. Enter system details in the online calculator (for auto calculation of energy generation potential value).

8.2.5. Submit photographs, with description, of all the RE systems installed in the project.



# SECTION 4: OCCUPANT COMFORT AND WELL-BEING

## Criterion 9 : Indoor Air Quality and Comfort

# Criterion 9: Indoor Air Quality and Comfort

## Intent

To ensure that occupants of the building are thermally, visually, and acoustically comfortable along with the provision of monitoring and maintaining IAQ.

**Maximum Points: 7**

## 9.1 Appraisals

**Visual comfort**

9.1.1. Ensure that all regularly occupied spaces meet GRIHA illuminance levels ( as per ECBC 2017) for the minimum percentage of floor area prescribed in Table 9.1 as per by GRIHA online calculator.

**Table 9.1:** Minimum requirement of percentage of floor area to be day-lit

| Percentage of floor area to be day-lit | Points |
|---|---|
| 25% ≤ x < 40% | 1 point |
| 40% ≤ x | 2 points |

**Thermal comfort**

9.1.2. Demonstrate that the project meets the required ventilation and thermal comfort for all regularly occupied spaces as per the below-mentioned strategies:

**– 1 Point**

- **For naturally ventilated occupied spaces**
  - Ensure that adequate openable window-to-floor area ratio is being met as per Eco-Niwas Samhita (ECBC-R, Part 1).

**Table 9.2:** Minimum requirement of window-to-floor area ratio

| Climate Zone | Minimum WFR% |
|---|---|
| Composite | 12.50 |
| Hot-Dry | 10.00 |
| Warm-Humid | 16.66 |
| Temperate | 12.50 |
| Cold | 8.33 |

- Ensure that ceiling fans are installed as prescribed in NBC 2016 to achieve adequate ventilation.

**Table 9.3:** Optimum fan size and number of fans for rooms of different sizes

| S. No. | Room Width (m) | Optimum Size (mm)/Number of Fans for Room Length | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4 m | 5 m | 6 m | 7 m | 8 m | 9 m | 10 m | 11 m | 12 m | 14 m | 16 m |
| 1 | 3 | 1200/1 | 1400/1 | 1500/1 | 1050/2 | 1200/2 | 1400/2 | 1400/2 | 1400/2 | 1200/3 | 1400/3 | 1400/3 |
| 2 | 4 | 1200/1 | 1400/1 | 1200/2 | 1200/2 | 1200/2 | 1400/2 | 1400/2 | 1500/2 | 1200/3 | 1400/3 | 1500/3 |
| 3 | 5 | 1400/1 | 1400/2 | 1400/2 | 1400/2 | 1400/2 | 1400/2 | 1400/2 | 1500/2 | 1400/3 | 1400/3 | 1500/3 |
| 4 | 6 | 1200/2 | 1400/2 | 900/4 | 1050/4 | 1200/4 | 1400/4 | 1400/4 | 1500/4 | 1200/6 | 1400/6 | 1500/6 |
| 5 | 7 | 1200/2 | 1400/2 | 1050/4 | 1050/4 | 1200/4 | 1400/4 | 1400/4 | 1500/4 | 1200/6 | 1400/6 | 1500/6 |
| 6 | 8 | 1200/2 | 1400/2 | 1200/4 | 1200/4 | 1200/4 | 1400/4 | 1400/4 | 1500/4 | 1200/6 | 1400/6 | 1500/6 |
| 7 | 9 | 1400/2 | 1400/2 | 1400/4 | 1400/4 | 1400/4 | 1400/4 | 1400/4 | 1500/4 | 1400/6 | 1400/6 | 1500/6 |
| 8 | 10 | 1400/2 | 1400/2 | 1400/4 | 1400/4 | 1400/4 | 1400/4 | 1400/4 | 1500/4 | 1400/6 | 1400/6 | 1500/6 |
| 9 | 11 | 1500/2 | 1500/2 | 1500/4 | 1500/4 | 1500/4 | 1500/4 | 1500/4 | 1500/4 | 1500/6 | 1500/6 | 1500/6 |
| 10 | 12 | 1200/3 | 1400/3 | 1200/6 | 1200/6 | 1200/6 | 1400/6 | 1400/6 | 1500/6 | 1200/7 | 1400/9 | 1400/9 |
| 11 | 13 | 1400/3 | 1400/3 | 1200/6 | 1200/6 | 1200/6 | 1400/6 | 1400/6 | 1500/6 | 1400/9 | 1400/9 | 1500/9 |
| 12 | 14 | 1400/3 | 1400/3 | 1400/6 | 1400/6 | 1400/6 | 1400/6 | 1400/6 | 1500/6 | 1400/9 | 1400/9 | 1500/9 |

Source: National Building Code 2016, Volume 2, Part 8

- **For air-conditioned occupied spaces**
  - Installation of HVAC as per sizing prescribed by SVAGRIHA heat load calculator (provided on the GRIHA online panel).

**Acoustic Comfort**

9.1.3. Attempt minimum two strategies from the following to reduce the noise levels:

**–2 Points**

- Interposing buffer zones in the building plan.
- Protection of habitable spaces by introduction of continuous green belts on the exposed side with broad leaf / evergreen trees, etc.
- Screening by solid barrier around the project boundary that is at least 8-ft high.
- Provision of adequate sound insulation in buildings envelope (walls and roofs).
- Provide indoor building materials (false ceilings, carpets, etc.) that have sound absorbing properties.
- Provide windows and frames that have high sound reduction properties.

**Indoor Air Quality**

9.1.4. Adopt at least two of the following strategies for achieving IAQ:

**–1 Point**

- Installation of a separate exhaust system for janitor/storage rooms for chemicals.
- Use of green cleaning products for housekeeping.
- Placement of outdoor air intake away from sources such as parking areas, DG, etc.
- No smoking inside project/provision of dedicated smoking areas (not applicable for residential areas)
- Control of effluents from parking areas.
- Air quality monitoring in parking areas.

9.1.5 Ensure the following to demonstrate compliance:

- All interior paints are low VOC as per Table 9.4 and are lead free.
- All composite wood products are free from urea formaldehyde

**-1 Point**

**Table 9.4**: VOC limits for paints

| Paint Application | Type of Finish | VOC Limit (g/L) |
|---|---|---|
| Interior coatings | Flat | <50 |
| | Non-flat | <100 |
| Exterior coatings | Flat | <50 |
| | Non-flat | <100 |
| Anti-corrosive | Gloss/semi-gloss/flat | <250 |

## 9.2 Compliance

**Visual comfort**

9.2.1. Submit daylight calculations on the SVAGRIHA online portal to demonstrate compliance.

9.2.2. Submit section drawings and floor plans (.dwg) of the project.

**Thermal comfort**

9.2.3. Submit narrative that project team will meet the thermal comfort requirement by submitting HVAC DBR (Design Basis Report) of the project indicating the considerations for values of load calculation along with the system design parameters if the HVAC system installed is below the GRIHA prescribed values as per SVAGRIHA heat load calculator (provided on the GRIHA online panel).

9.2.4. Submit purchase orders and specification sheets of the HVAC system installed in the project.

OR

9.2.4. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

9.2.5. Submit an electrical drawing highlighting the fan layout.

9.2.6. Submit invoice and specification sheets of fans systems installed in the project.

OR

9.2.6. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

**Acoustic comfort**

9.2.7. Submit narrative along with photographs highlighting the strategies adopted in the project to mitigate the effect of outdoor noise.

9.2.8. Submit technical specification sheets of noise insulation and/or glazing used in the building for noise reduction.

OR

9.2.8. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

**Indoor air quality**

9.2.9. Submit detailed narrative highlighting the strategies adopted in the project to maintain IAQ.

9.2.10. Submit technical specification sheets/brochures and purchase orders (reflecting full quantities) of all interior paints highlighting that they have low VOC content and are lead-free.

OR

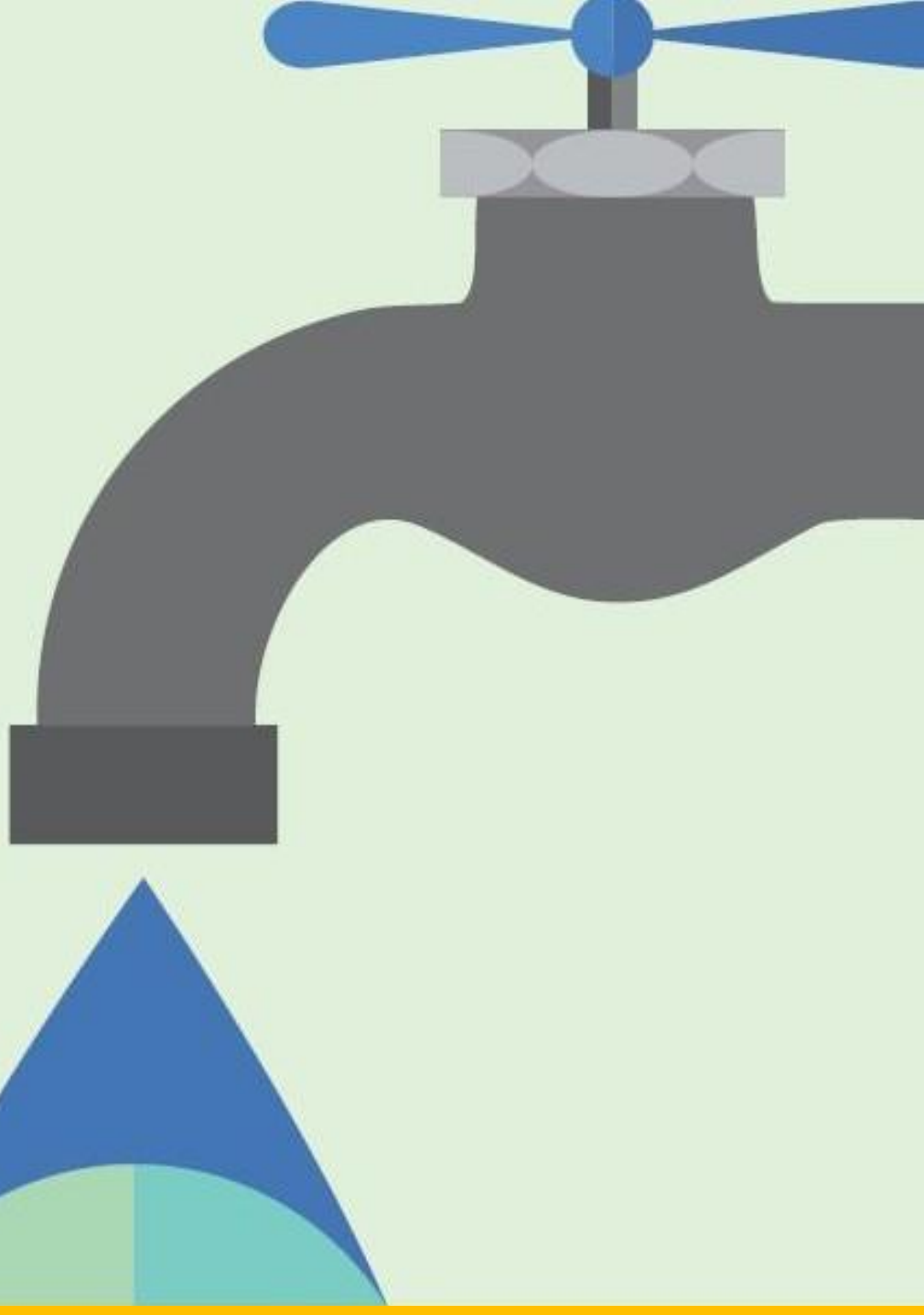
9.2.10. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

9.2.11. Submit technical specification sheet/brochure of composite wood products specifying the bonding resin.

OR

9.2.11. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

9.2.12 Submit purchase orders reflecting full quantities of composite wood-based products



# SECTION 5 : WATER MANAGEMENT

Criterion 10 : Reduction in Building and Landscape Water Demand
Criterion 11 : Rainwater Management

Microsoft Edge

# Criterion 10: Reduction in Building and Landscape Water Demand

## Intent

The intent of this criterion is to reduce overall water demand of the project through implementation of efficient design techniques and adoption of technological advancement.

**Maximum Points: 5**

## 10.1. Appraisal

**Building water demand reduction**

10.1.1 Demonstrate reduction in building water demand from the SVAGRIHA base case as per Table 10.1.

**Table 10.1:** Percentage reduction in building water demand

| Reduction from SVAGRIHA Base Case | Points |
|---|---|
| 10% ≤ x < 25% | 1 |
| 25% ≤ x <40% | 2 |
| 40% ≤ x | 3 |

**Note:** All faucets installed in spaces with water head heights less than 5m/17ft, in a gravity-fed system, are exempt from calculations in Appraisal 10.1.1.

**Landscape water demand reduction**

10.1.2 Demonstrate reduction in landscape water demand from the SVAGRIHA base case as per Table 10.2.

**Table 10.2:** Percentage reduction in landscape water demand

| Reduction from SVAGRIHA Base Case | Points |
|---|---|
| 40% ≤ x < 70% | 1 |
| 70% ≤ x | 2 |

**Note**: Potted plants are not considered in the calculation.

## 10.2 Compliance

10.2.1. Submit a narrative and photographs of all the strategies adopted in the project.

10.2.2. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisals 10.1.1 and 10.1.2.

**Building water demand reduction**

10.2.3. Submit purchase orders showing the procurement of low-flow fixtures or fixtures from GRIHA product catalogue.

10.2.4. Submit technical specification sheet/brochure of the low-flow fixtures procured specifying their flow rates.

OR

10.2.4. Submit a valid GRIHA Product Catalogue certificate as applicable for the product.

**Landscape water demand reduction**

10.2.5. Submit a landscape plan highlighting the irrigation system for the various plant species along with the legend.

# Criterion 11: Rainwater Management

## Intent

The intent of this criterion is to conserve rainwater to offset the water demand of the project and replenish groundwater.

**Maximum Points: 3**

## 11.1 Appraisal

11.1.1. Demonstrate that the post-construction storm water run-off from the site is being managed within the GRIHA project boundary as per Table 11.1 based on the peak hourly rainfall (mm/h).

**Table 11.1:** Percentage of Storm water Run-off Managed on-site

| Post-construction Storm water Run-off Managed On-site (x) | Points |
|---|---|
| 25% ≤ x ≤ 50% | 1 |
| 50% ≤ x < 75% | 2 |
| 75% ≤ *x* ≤ 100% | 3 |

## 11.2 Compliance

11.2.1. Submit calculations on the SVAGRIHA online portal to demonstrate compliance with Appraisals 11.1.1.
11.2.2. Submit a narrative and photographs of all the strategies adopted in the project.
11.2.3. Submit site plan showing the location of rainwater storage tanks and recharge pits on site.
11.2.4. Submit sections of RWH systems on-site.
11.2.5. Submit landscape plan clearly highlighting various site surface finishes supported with area statement.
11.2.6. Submit purchase orders showing the procurement of RWH system.


# SECTION 6 : SOLID WASTE MANAGEMENT

## Criterion 12 : Solid Waste Management

# Criterion 12: Solid Waste Management

## Intent

The intent of the criterion is to promote adoption of waste management strategies on-site to divert waste from landfills and convert them into resources.

**Maximum Points: 3**

## 12.1. Appraisal

12.1.1. Segregate waste at source by provision of multi-coloured bins on-site.

**–1 Point**

12.1.2. Adopt appropriate waste management strategies as per Table 6.4 for treatment of waste generated onsite. (Refer to the table provided in the detailed SVAGRIHA V.3 manual)

**–2 Points**

## 12.2 Compliance

12.2.1. Submit narrative demonstrating the waste management strategies adopted in the project.

12.2.2. Submit date stamped contextual photographs showing multi-coloured bins on-site and other strategies adopted to demonstrate compliance.

12.2.3. Submit purchase orders of various waste management systems installed on-site indicating their capacities.

12.2.4. Submit contractual tie-ups with recyclers for recyclable inorganic wastes to demonstrate compliance.

# SECTION 7 : SUSTAINABLE LIFESTYLE

## Criterion 13 : Adoption of Sustainable Lifestyle

# Criterion 13: Adoption of Sustainable Lifestyle

## Intent

To adopt sustainable lifestyle measures that lead to personal, social, and environmental well- being.

**Maximum Points: 5**

## 13.1 Appraisal

### Access to basic amenities

13.1.1 The maximum distance travelled to basic amenities should be as specified by SVAGRIHA in Table 13.1.

**–1 point**

**Table 13.1:** Limits for distance travelled to basic amenities

| Building Typology | Minimum Basic Amenities | Maximum Distance Travelled (km) |
|---|---|---|
| Residential | 7 | 2100 |
| Non-residential | 6 | 2000 |

### Built-up area per capita

13.1.2 Ensure construction according to built-up area per capita range specified by SVAGRIHA in Table 13.2.

**–1 point**

**Table 13.2:** Built-up area per capita thresholds for different building typology

| Building Typology | Per Capita Built-up Area (in m²) |
|---|---|
| Residential | $12.5 \leq x \leq 50$ |
| Commercial (except retail) | $5 \leq x \leq 10$ |
| Healthcare (per bed) | 100 |
| Hospitality (per room) | $35 \leq x \leq 60$ |
| Institutional | $4 \leq x \leq 8$ |
| Retail | $3 \leq x \leq 6$ |

### Enhancing liveability

13.1.3 Ensure adoption of minimum 2 strategies mentioned in Table 13.3 to enhance overall liveability of the project.

**–2 Points**

**Table 13.3**: Strategies to be adopted to enhance liveability.

| Building Typology | Strategies |
|---|---|
| Residential | • Access to nature by adopting any of the strategies mentioned in '13.3-Details of Appraisals' (This part of the criteria shall be provided in the detailed SVAGRIHA V.3 manual)<br>• Dedicated space for work/study/recreation<br>Note: The room should be separated from the other areas using solid partitions to avoid any disturbance.<br>• Kitchen garden/plant minimum one fruit-bearing tree along the periphery of the site (inside or outside) that can benefit the society. |
| Non-Residential | • Access to nature by adopting any of the strategies mentioned in '13.3-Details of Appraisals' (This part of the criteria shall be provided in the detailed SVAGRIHA V.3 manual)<br>• Workstation design as mentioned in '13.3-Details of Appraisals' (This part of the criteria shall be provided in the detailed SVAGRIHA V.3 manual)<br>• Provision of toilet and resting room for service staff |

**Environmental Awareness**

13.1.4 Adopt environmental awareness strategies as mentioned in Table 13.4.

**–1 point**

**Table 13.4**: Strategies to be adopted to promote environmental awareness

| Building Typology | Strategies |
|---|---|
| Residential | • Minimum 5 posts on social media handles regarding strategies adopted for SVAGRIHA to minimize the impact of the project on the ecosystem and/or<br>• Post a video on social media handles covering the strategies adopted in the project. Note: #GRIHA4ALL should be used for all social media posting. |
| Non-Residential | • Ensure that the project adopts at least one measure on-site to create environmental awareness amongst its occupants and visitors. |

## 13.2 Compliance

**Access to basic amenities**

13.2.1. Submit a satellite image highlighting the walking distance from the main gate to the closest basic amenities around the site.

**Per capita construction**

13.2.2. Submit sanctioned/approved plans along with area statement.

**Enhancing liveability**

*Residential*

13.3.3. Plans/sections/elevations highlighting the following (as required for the strategies adopted):

- Strategies adopted for access to nature
- Location of dedicated work/study/rehabilitation space
- Location of kitchen garden/ location of fruit-bearing tree on-site

13.3.4. Submit photographs demonstrating the strategies adopted on-site as per Table 7.4.

*Non-residential*

13.3.3. Plans/sections/elevations highlighting the following:

- Strategies adopted for access to nature
- Workstation designed as per SVAGRIHA
- Location of dedicated toilets and resting room for service staff

13.3.4. Submit narrative and photographs demonstrating the strategies adopted on-site as per Table 7.4.

**Environmental awareness**

*Residential*

13.2.5. Submit screenshots of 5 posts/link of one or more video on social media handle regarding strategies adopted under each section of SVAGRIHA to minimize the impact of the project on the ecosystem.

*Non-residential*

13.2.5. Submit narrative demonstrating strategies adopted on-site for environmental awareness along with photographs supporting the same.

# SECTION 8 : INNOVATION

## Criterion 14: Innovation

# Criterion 14: Innovation

## Intent

To promote the adoption of meritable strategies that enhance the sustainability quotient of the project.

**Maximum Points –2**

## 14.1 Appraisal

14.1.1 Adopt any 2 strategies independent of the above criteria to make the project more sustainable.

**–2 Points**

- SVAGRIHA certified professional/team to be involved in the project from the commencement till the completion.
- Use of self-healing concrete in construction
- A zero post-construction waste site
- A net zero energy building
- A water positive building
- Use of transparent wood, insulated daylighting panel (IDP) as alternative to building glass
- Use of dynamic façade
- Use of upcycled furniture in the building
- Use of zero ODP and low GWP refrigerants and insulations
- Use of green insulation materials
- Use of BIPV, green walls, treatment of building façade by nano-façade coatings and exterior building insulations
- Use of solar tube or sun tunnel for daylighting
- Use of sensors (daylight sensors and occupancy sensors) for control of lighting and HVAC systems.
- Any other innovative strategy enhancing the overall sustainability of the project

## 14.2 Compliance

14.2.1 Submit detailed narrative and date-stamped photographs clearly depicting the strategies implemented
14.2.2 Submit survey plan according to the strategy
14.2.3 Submit purchase orders of equipment installed in the project
14.2.4 Submit specification sheets of equipment installed in the project
14.2.5 Submit floor plans highlighting location of sensors, amenities provided in the project and material used inside the building
14.2.6 Submit sections and elevations of the building façade
14.2.7 Submit calculation of total energy offset of the project
14.2.8 Submit calculation demonstrating that project is a net zero waste site
14.2.9 Submit supporting documentation for each innovative strategy implemented by the project team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